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AIC-31-VI

Information Sheet
DRYING-RATE NOMOGRAPHS VI. SWEETPOTATO STRIPS

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A method of estimating drying times from drying-rate nomographs has been published in the form of an information sheet (AIC-31-I), and drying-rate nomographs are available for riced white potatoes (AIC-31-I), blanched sweet corn (AIC-31-II), white potato strips under through-flow conditions (AIC-31-III), shredded cabbage (AIC-31-IV), and onion slices (AIC-31-V).

The drying-rate characteristics of 1/4" sweetpotato strips (Porto Rico variety) are presented nomographically in this information sheet. The sweetpotatoes were peeled by abrasion, trimmed by hand, washed, and cut into 1/4" strips in a mechanical strip cutter. The strips were loaded directly on metal grid trays, blanched for 6 minutes in steam at atmospheric pressure, and dried without further rinsing.

The drying-rate nomographs included in this information sheet are:

- Figure 1 - Drying from $T_o = 2.2$ to $T = 0.25$ at reference conditions of L_o and V
- Figure 2 - Effect of L_o and V on Figure 1
- Figure 3 - Drying from $T = 0.25$ to T_f
- Figure 4 - θ corrections for $T_o > 2.2$

The effects of tray-loading density and air velocity upon drying times from T_o to T are related by the equation

$$\theta \text{ (at } L_o, V) = \theta_r \cdot f(V, L_o)$$

In this equation, θ_r is the drying time from T_o to T under reference conditions (of $L_o = 1.5$ lb./sq. ft. and $V = 745$ ft./minute, cross air flow) as obtained from Figure 1, and values of $f(V, L_o)$ are obtained from Figure 2. The function, $f(V, L_o)$, must correspond to the values of L_o and V under consideration and must be selected at the value of T to which θ and θ_r apply. (The nomenclature used is that listed in Information Sheet AIC-31-I.) Below $T = 0.25$, drying times are essentially independent of air velocity and of tray-loading density within the ranges investigated, i.e., $V = 400$ to 1200 ft./minute and $L_o = 0.75$ to 2.5 lbs./sq. ft.

General Notes on Sweetpotato Drying

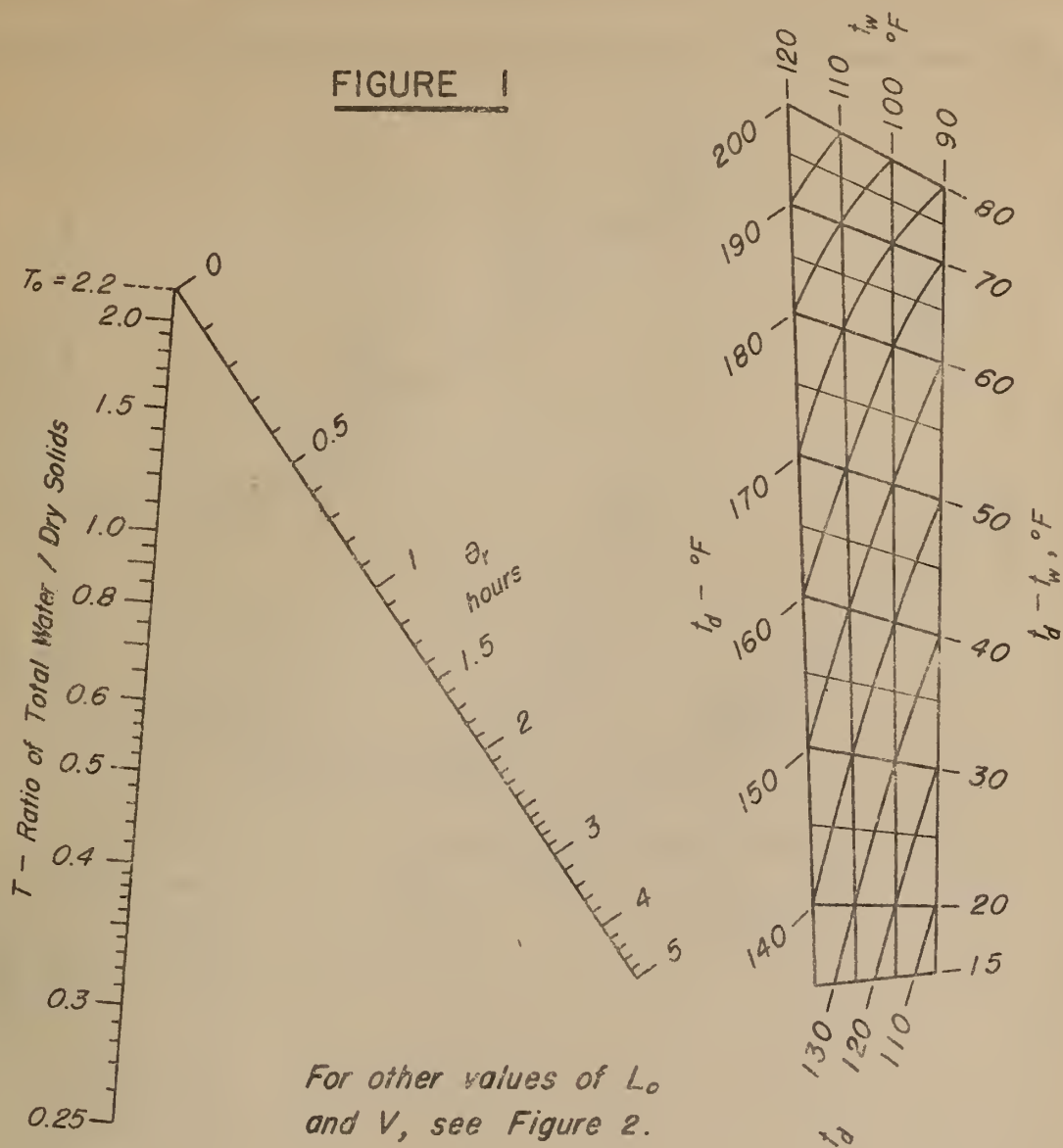
A substantial fraction of the total drying time for sweetpotatoes occurs below $T = 0.15$. Consequently, finishing bin driers are to be recommended for the final drying stages and should be used at the highest moisture content at which the material may be detrayed and handled without damage from breaking or crushing.

Freshly-blanching sweetpotato strips are soft and difficult to handle without destruction of piece identity. In addition to interfering with the appearance of the product, handling mats the material and increases the drying time. Consequently, loading of the cut strips on the trays before blanching appears advisable. Metal trays are preferable for this purpose. Wooden trays absorb large quantities of water during the blanching process and increase the amount of evaporation to be accomplished in the dehydrator.

Variations in blanching time from 3 to 15 minutes for the sweetpotato strips were found to have no appreciable effect on drying times. Material that was washed after blanching absorbed enough water to increase the moisture content from $T_o = 2.2$ to $T_o = 3.1$. However, the total drying time from T_o to $T_f = 0.07$ for the quenched material was about 8% less than for the unquenched material.

"Case-hardening" may appear in the drying of $1/4$ " sweetpotato strips under severe drying conditions such as $t_d = 200^\circ \text{ F.}$, $V > 1000 \text{ ft./minute}$, and a relative humidity of about 3% or less. The effect is not serious under these conditions and is not significant in the normal range of operating conditions.

FIGURE 1



M.E.L. 6-26-44

DRYING OF SWEETPOTATOES, $1/4''$ STRIPS

PORTO RICO VARIETY

FROM $T_o = 2.2$ TO $T = 0.25$

$L_o = 1.5$ lbs./sq.ft. on Metal Grid Trays

$V = 745$ ft./min., Cross Air Flow

$T_0 = 2.2$

Ratio of Total Water / Dry Solids

1.5
1.0
0.8
0.6
0.4
0.25

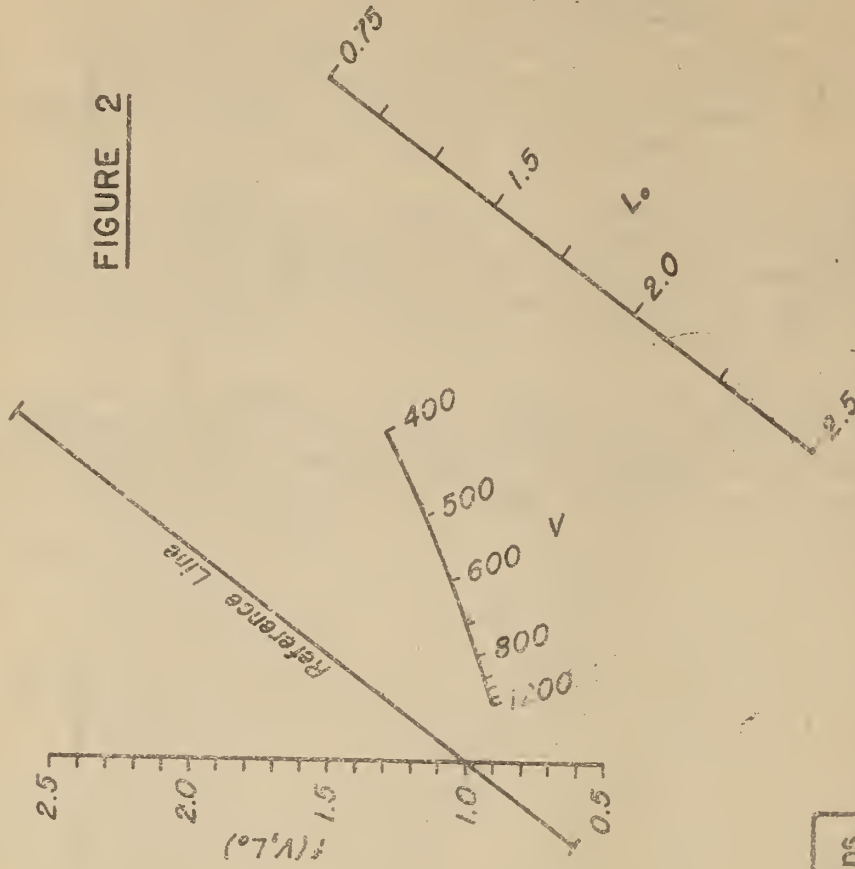


FIGURE 2

Drying of Sweetpotatoes, 1/4" Strips

Porto Rico Variety

VALUES OF $f(V, L_0)$ FOR

EQUATION $\theta(\text{at } V, L_0) = \theta_p \cdot f(V, L_0)$

Metal Grid Trays, Cross Air Flow

KEY

1. Connect L_0 to V to Reference Line.
2. Connect Reference Line to T .
3. Read value of $f(V, L_0)$.

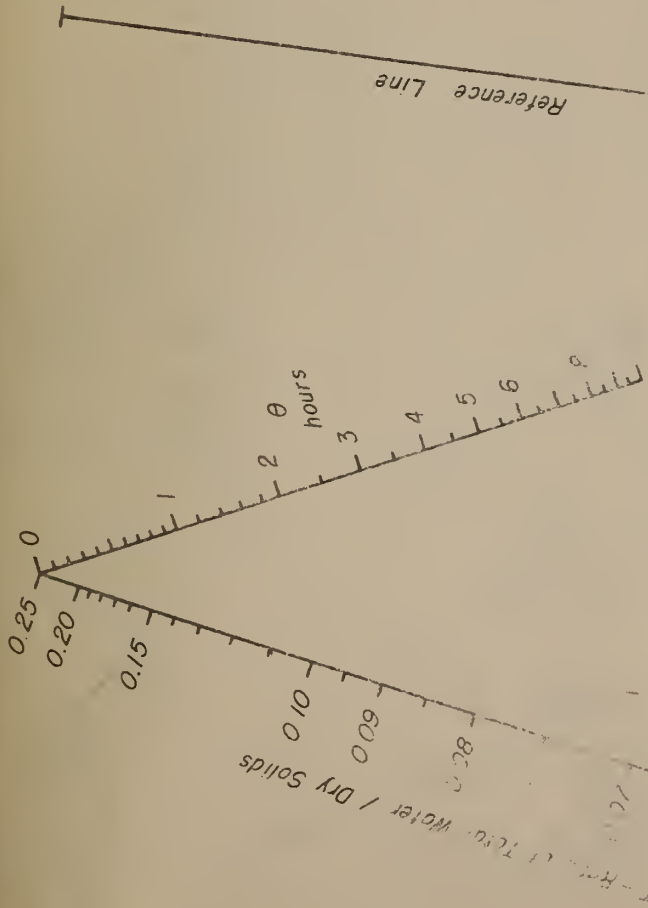
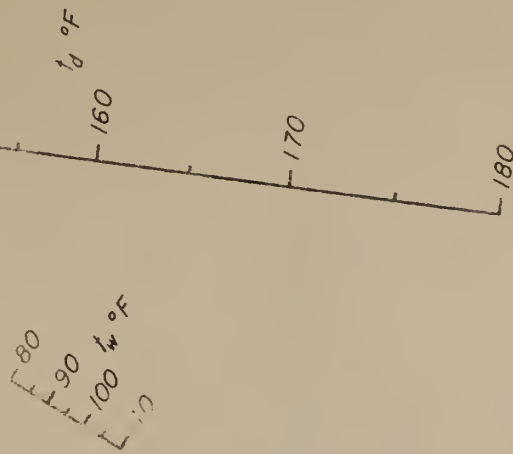


FIGURE 3



KEY

1. Connect t_d to t_w to Reference Line.
2. Connect Reference Line to T .
3. Read drying time from θ axis.

DRYING OF SWEETPOTATOES, 1945

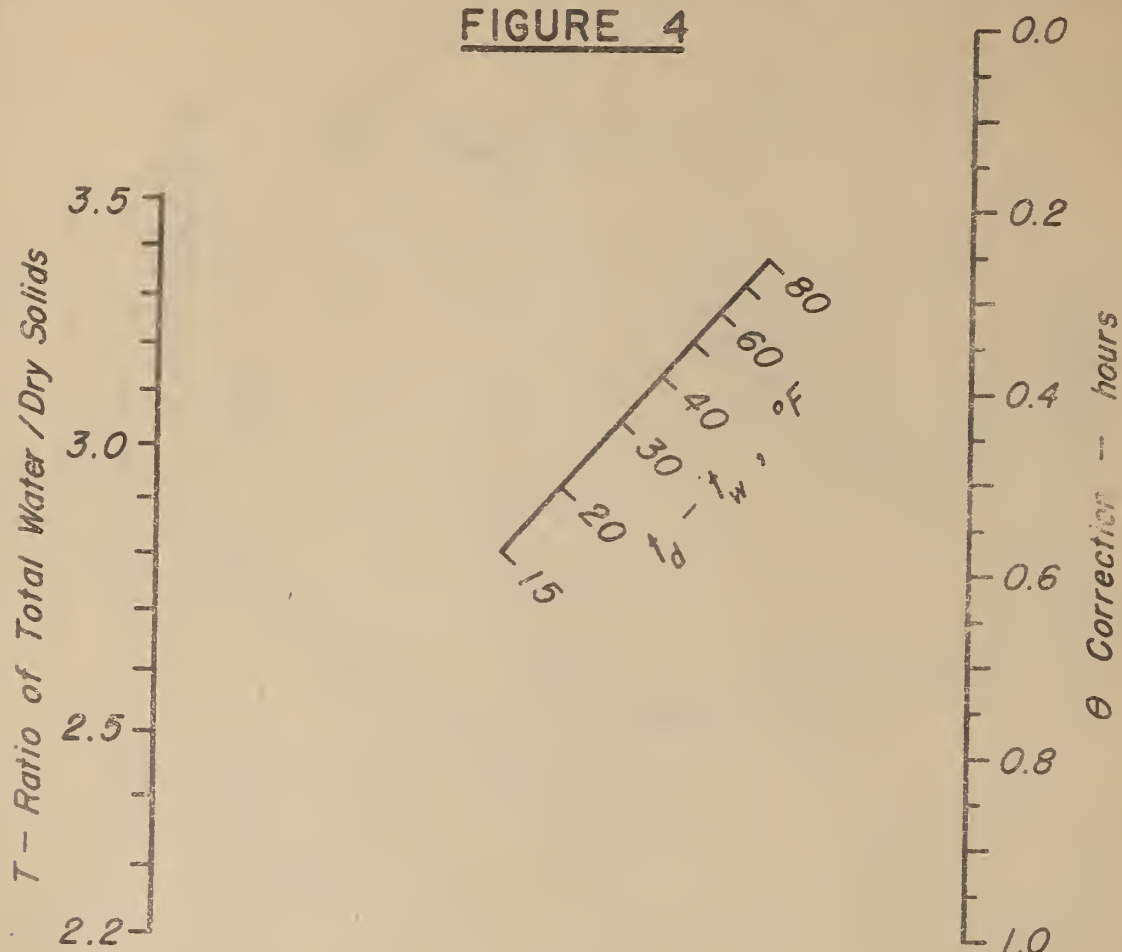
PORTO RICO VARIETY

DRYING FROM T 0.25 T

$L_o = 0.75$ to 2.5 lbs./sq.ft. on Metal Grid Trays

$V = 400$ to 1200 ft./min., Cross Air Flow

FIGURE 4



M.E.L. 6-26-44

Drying of Sweetpotatoes, 1/4" Strips
Porto Rico Variety

CORRECTION OF θ_r FOR $T_o > 2.2$

$L_o = 1.5$ lbs./sq.ft. on Metal Grid Trays

$V = 745$ ft./min. Cross Air Flow

